

『영미연구』

제53집 (2021): 83-108

<http://doi.org/10.25093/ibas.2021.53.83>

Use of Verb Bias and Complementizer Cues in L2 Written Production*

Ji Hyon Kim

Hankuk University of Foreign Studies

[Abstract]

This study investigates how L2 learners use verb bias information and the complementizer *that* in their production of English sentences. In a written production task, L1 Korean L2 English learners were presented with thirty English verbs ranging from verbs with strong direct object (DO) bias to verbs with strong sentential complement (SC) bias. The proportion of SC sentence structures produced by the L2 learners showed a positive correlation with SC-bias strength and a significant negative correlation with its DO-bias strength. These results suggest that the L2 learners had acquired verb bias frequencies and used verb bias information in a way similar to native English speakers. However, results also revealed a pattern in L2 learners' use of the optional complementizer *that* that differed from results previously reported for native English speakers. The proportion of sentences for which the complementizer was used to introduce the embedded clause was positively correlated with the verb's strength of SC-bias and negatively correlated with strength of DO-bias. The tendency for L2 learners to prefer redundant cues in written production

* This work was supported by Hankuk University of Foreign Studies Research Fund 2021.

are discussed in terms of exposure-based accounts of language acquisition.

Key Words: verb bias, statistical frequencies, complementizer, predictive cues, written production task

1. Introduction

Verbal information plays an essential role in the successful processing of language. The same verb may be found in various syntactic structures, but verbs will differ in the relative frequencies with which they are used in each structure. For example, a sentence beginning with *The writer read the book ...* can be completed in two different ways, as shown in (1). In the direct object (DO) completion shown in (1) a, *the book* must be parsed as the NP object of the verb *read*, so that the sentence is interpreted to mean that the writer read the book. In contrast, in (1) b, the NP *the book* takes the role of the subject of the embedded sentential complement (SC). Therefore, in this reading, it is not the book that the writer read, but rather the news about the book's date of publication.

- (1) The writer read the book ...
a. ... yesterday.
b. ... would be published next year.

A temporary ambiguity exists in this sentence, as the NP *the book* may be used as either the DO or SC, depending on what follows. This ambiguity is resolved upon the processing of *yesterday* in (1)a or *would* in (1)b. While it is possible for this

temporary ambiguity to be eliminated by including the complementizer *that* before the subject of the SC in (1)b, e.g., *The writer read that the book would be published next year*, previous studies have shown that verbs that are commonly used in the SC structure frequently omit the complementizer (Garnsey, Pearlmutter, Myers, & Lotocky, 1997; Lapata, Keller, & Schulte im Walde, 2001).

If the reader predicts that the NP *the book* is likely to play the role of the DO of the verb *read*, there will be no problem if the sentence continues as in (1) a. However, if the sentence continues as in (1) b, a reanalysis of the syntactic structure must take place, resulting in additional time and processing costs.

Knowledge of verbal information, in particular, the frequencies with which each verb appears in a certain structure, helps to minimize incorrect predictions regarding how the sentence will unfold and results in more efficient processing. This type of verbal information is referred to as verb bias. Verbs are categorized as DO-bias, SC-bias and Equibias (EQ) verbs depending on the type of structure they occur in most frequently. For example, *read* is a DO-bias verb, so that upon reading the sentence beginning in (1), readers initially analyze *the book* as the NP object. In contrast, *indicate* belongs to the class of SC-bias verbs, so that readers will expect a SC to follow the verb. Hence, verb bias information serves a cue that helps the reader to predict the upcoming structure, which results in more efficient sentence processing.

Although verb bias information plays an important role in the processing of sentences, most previous studies investigating the access and use of verb bias have mostly been focused on native English speakers. Second language (L2) research has been more centered on how L2 learners acquire and use verb transitivity (Brooks, Tomasello, Dodson, & Lewis, 1999; Chung, 2014; Montrul, 2001; Oshita, 2000; Ju, 2000).

Both types of verbal information are concerned with the sentence structure in which a verb appears, but incomplete acquisition of verb bias and verb transitivity may have different consequences. For example, if an L2 learner has not yet learned that *die* is an intransitive verb, he may produce a sentence such as **The terrorist died the hostage*. Therefore, incomplete or faulty acquisition of verb transitivity may lead to grammatically unacceptable sentences. However, incomplete acquisition of verb bias does not result in the production of ungrammatical sentences. Rather, L2 learners who have not yet acquired full sensitivity to verb bias may use verbs in sentence structures which are less frequently used by native English speakers, or make a higher proportion of incorrect predictions about how a sentence will unfold. This difference in the consequences that could result from a failure to acquire verb bias and verb transitivity may be one of the reasons why the acquisition and use of verb bias by L2 learners is a topic which has not been extensively studied. However, incomplete acquisition of verb bias by L2 learners may lead to in a higher probability of incorrect predictions during online processing, which in turn will result in less efficient processing compared to native English speakers. The next section provides an overview of the existing literature examining the role of verb bias in the monolingual and L2 literature.

2. Literature Review

The method most commonly used to examine the relative frequencies with which different verbs appear in a DO or SC structure is to collect data from native speakers through a norming task (Gahl, Jurafsky & Roland, 2004; Garnsey et al., 1997; Pickering, Traxler & Crocker, 2000). Participants are presented with sentence-initial

fragments, usually consisting of a subject NP and transitive verb such as *The policeman established ...*, and are required to complete the sentence. The sentence completion data are coded and categorized by syntactic structure, and the proportion of DO and SC structures for each verb are calculated.

In general, two methods have been used to identify a verb's bias: relative categorization or absolute categorization. The relative method uses the ratio of DO and SC structures for a verb for categorization. Verbs are classified as DO-bias verbs if sentence completions with a DO complement are at least twice as frequent as sentence completions with a SC, and vice versa for SC-bias verbs. Verbs for which neither the DO or SC structure is more than two times as frequent as the other are classified as EQ-bias verbs. In contrast, the absolute categorization method takes into account the absolute percentage of each type of sentence structure. A verb is categorized as DO-bias if sentence completions with a DO complement constitute greater than fifty percent of the entire data, and SC-bias if the percentage of SC structures exceed fifty percent of the data. In cases where neither DO nor SC structure constitutes greater than half of the sentence completions, the verb is then classified as EQ-bias. The resulting grouping of verbs into the DO-bias, SC-bias or EQ-bias verb category is then used as a base for consultation when constructing the material for experimental psycholinguistic.

Using self-paced reading, Garnsey et al. (1997) investigated how native English speakers accessed and used their knowledge of verb bias in their processing of the temporarily ambiguous sentences shown in (2).

- (2) a. The talented photographer accepted the money could not be paid.
- b. The ticket agent admitted the airplane had a mechanical problem.

Both sentences in (2) have the same SC structure, and are temporarily ambiguous at

the NP following the main verb. The temporary ambiguity is resolved at the embedded verb of the SC at which point it becomes clear that the NP is not the object of the main verb but must be the subject of the SC. The main verb *accepted* in (2) a is a DO-bias verb, whereas the main verb *admitted* in (2) b is a SC-bias verb. Therefore, if readers use verb bias to predict the upcoming structure, more processing difficulty is predicted at the disambiguation region *could* in (2) a, as the DO-bias information of the main verb *accept* would predict a DO complement. The results confirmed these predictions. When reading times for the disambiguation region in the temporarily ambiguous sentences were compared with reading times for the same region in unambiguous versions of the sentence with the complementizer *that* preceding the SC, the difference in reading times was greater for the DO-bias verbs. These findings were confirmed and replicated in numerous studies employing eyetracking and brain-based measures (Novais-Santos, Gee, Shah, Troiani, Work & Grossman, 2007; Osterhout, Holcomb & Swinney, 1994; Şafak & Hopp, 2021; Trueswell, Tanenhaus & Kello, 1993; Wilson & Garnsey, 2009).

Recent studies have started to investigate whether L2 learners of English are also able to acquire verb bias frequencies and access this information during real-time processing, albeit not as extensively as in the monolingual literature. In a self-paced reading study, Dussias and Cramer Scaltz (2008) investigated whether Spanish L2 learners of English used verb bias information in their processing of temporarily ambiguous sentences. Reading times found for the L2 learners were quite similar to the pattern previously found for native English speakers. However, when the twenty English verbs used in the experimental sentences were normed with L2 learners from the same population, four verbs which had been categorized as SC-bias for the native English speakers resulted in DO-bias for the L2 learners. Effects of verb bias were strongest when the analysis of reading times included only the verbs for which verb

bias was matched for native English speakers and L2 learners. These findings raise the concerns regarding the validity of using native English speaker norming data as a baseline for constructing stimuli for L2 experimental studies.

Lee, Lu and Garnsey (2013) compared how native English speakers and L2 learners used the combination of the two cues of verb bias and the complementizer *that* to predict upcoming structure during processing. Reading times for the native English speakers showed a reliable interaction between verb bias and complementizer. While reading times were slower on the disambiguation region for DO-bias verbs on the ambiguous sentences compared to the unambiguous versions with the complementizer, no difference in reading times was found for the SC-bias verbs. These results were interpreted to suggest that the presence of the complementizer *that* was redundant for SC-bias verbs, and not required for the native English speakers to predict the upcoming SC. The redundancy of the two cues was also suggested in a previous norming study conducted by Garnsey et al. (1997), which showed a reliable negative correlation between the presence of the complementizer in SC structures and the verb's strength of SC-bias.

In contrast, the L2 learners in Lee et al. (2013) exhibited a different pattern, with low-proficiency learners slowing down at the disambiguation region when the complementizer was absent for both DO-bias and SC-bias verbs. Lee et al. (2013) concluded that these L2 learners had not yet learned to optimally combine verb bias and complementizer cues like native English speakers, and relied on verb bias to confirm the complementizer cue, even though the presence of the complementizer should have been sufficient to signal that a SC would follow. These results were replicated and confirmed in a subsequent study with native (L1) Mandarin L2 English learners (Qian, Lee, Lu & Garnsey, 2019).

To summarize, the results of previous studies suggest that L2 learners of English

are able to use information about verb bias to predict upcoming sentence structure during their processing of temporarily ambiguous sentences, similar to what has been found with native English speakers. However, unlike native English speakers, L2 learners, especially those with low L2 proficiency, were not able to optimally combine verb bias and complementizer cues and did not benefit from verb bias information alone.

A point of consideration concerning these studies is that norming data from native English speakers was used in the construction of the experimental stimuli in these online studies. Therefore, it is possible that a proportion of the verbs used as experimental stimuli could have yielded a different verb bias classification or showed a different degree of verb bias strength if norming had been conducted with L2 learners, as previously found by Dussias and Cramer Scaltz (2008). It is necessary to examine how these cues are employed in L2 learners' written production, and whether these patterns match those of native English speakers. If the use of verb bias and complementizer cues by L2 learners differs from those of native English speakers, inaccurate classification of certain verbs in the experimental material may result in data that does not correctly reflect how L2 learners use this information during online processing.

The present study addresses these issues and investigates how L1 Korean L2 English learners use verb bias and complementizer cues in a written production task. If L2 learners' use of the two cues differs from native English speakers in their written production as well as processing, the results of the present study are predicted to differ from previously reported L1 norming data. In contrast to native English speakers, for which the complementizer *that* was omitted more often for verbs with strong SC-bias, L2 learners are predicted to prefer the complementizer in proportion to SC-bias strength. If, however, L2 learners' use of verb bias and complementizer

cues in written production resemble the patterns shown by native English speakers, sentence completions are predicted show increasing use of the complementizer *that* in SC structures in proportion to a decrease in strength of SC-bias to compensate for the weaker cues.

3. Research Method

3.1. Participants

Twenty-five L1 Korean L2 English learners who were enrolled in the undergraduate program at a Korean university participated in the present study. Prior to the main task, the participants completed a survey including questions about their language learning background, self-rated English proficiency, and recent TOEIC scores. One participant whose native language was Chinese and two participants who reported having resided for more than two years in a country where English was used as the main language were excluded from the main experiment. This was to ensure that the L2 learners were relatively homogeneous regarding their language background, as previous studies have shown that L2 learners acquiring English in different language environments are exposed to input that may contain different frequency patterns for the same syntactic structure (Dussias & Sagarra, 2007; Jiang, 2007; Juffs, 1998). The L2 participants' background information is summarized in Table 1.

Table 1. L2 Participants' Background Information

	Age	TOEIC scores (out of 990)	Self-rated proficiency ¹⁾			
			R	W	S	L
Mean	24.05	919.17	3.59	3.18	2.91	3.55
SD	1.29	45.57	0.79	0.80	1.02	0.91
Range	22-28	835-980	3-5	2-5	2-5	3-5

3.2. Experimental Materials

The verbal stimuli were selected from the verbs used in a previous norming study with native English speakers by Garnsey et al. (1997). The forty-eight verbs in Garnsey et al. (1997) were grouped into DO-bias, SC-bias, and EQ-bias verbs based on the relative classification method described earlier. For purposes of the present study, these verbs were reanalyzed using the absolute classification method, and any verbs for which verb bias categorization changed as a result of the different classification criteria were not included as verbal stimuli. From the remaining pool of verbs, ten verbs from each verb bias category which were relatively high in frequency were selected so that the verbs would be familiar to the L2 learner participants. As a result, a total of thirty English verbs were selected to construct the experimental stimuli for the written production task. All verbs were controlled for frequency and length.

The selected verbs were used to make thirty sentence-initial fragments for the written production task. All sentence fragments were composed of a subject NP followed by the past tense form of the verb, e.g., *The journal editor printed _____*, and were adapted from those used in Garnsey et al. (1997) so that they did not include any words that were judged to be difficult for the L2 learner participants. The order in which the sentence fragments were presented was pseudo-randomized so

that more than two items from the same verb group did not appear consecutively.

3.2. Experimental Procedure

Each participant filled out the language background survey individually in a quiet room. After the survey was completed, the participant was given the written production task. A randomized list of thirty sentence-initial fragments were presented, and participants were instructed to provide a continuation for each fragment so that the result would be a complete, grammatical sentence. Instructions were printed in English at the top of the form, and further instructions were also provided in Korean if clarification was required. The entire experimental procedure took less than thirty minutes total.

3.3. Data Coding and Analysis

The sentence completion data was coded by syntactic structure according to the coding criteria given in Gahl et al. (2004). When an NP was used as the object of the main verb in the sentence fragment, the sentence was coded as *DO*. Sentences with an embedded clause structure were classified into two categories depending on whether they occurred with the complementizer *that* or not. Sentences in which the main verb was followed directly by the NP subject of the embedded clause were coded as *SC*, and sentences in which the main verb was followed by the complementizer *that* + *SC* were coded as *SC-that*. Sentences in which the main verb was followed by the infinitival form of another verb in the form of 'to + V', were coded as *INF*, and those in which the main verb was followed by a preposition + NP object were coded as *P*. Intransitive structures where the main verb was not followed

by a complement, but an adverbial or prepositional phrase were coded as *IT*. Finally, sentence completions that resulted in an ungrammatical sentence were coded as *UNG*. Minor misspellings that did not interfere with the sentence were not included in this category, and were categorized according to the coding criteria based on their syntactic structure. Table 2 summarizes the coding criteria used to classify the sentences and provides a sample sentence for each category taken from the sentence completion data.

Table 2. Coding Criteria for Sentence Completions

Type	Example
DO (NP direct object)	<i>The policeman <u>established</u> the rules.</i>
SC (SC without 'that')	<i>The biologist <u>guaranteed</u> the test would succeed.</i>
SC-that (SC with 'that')	<i>The doctor <u>discovered</u> that the patient was stable.</i>
INF (Infinitival verb)	<i>The traveler <u>claimed</u> to be tired.</i>
P (Preposition + NP)	<i>The teenager <u>confided</u> in her best friend.</i>
IT (Intransitive)	<i>The diplomat <u>understood</u> incorrectly.</i>
UNG (Ungrammatical)	<i>*The politician <u>denied</u> because of bribery.</i>

After all sentence completions were coded, correlation analyses were conducted a series of correlation analyses were conducted with the following factors: mean proportion of DO, SC, and SC-that structures for each verb found in the L2 data, and each verb's strength of DO-bias, SC-bias, and *that*-preference reported in the native English speaker data reported in Garnsey et al. (1997).

The correlation analyses in the present study included verb bias category and proportion of complementizer use as a continuous factor instead of adopting the categorical grouping of verbs into DO-bias, EQ-bias, and SC-bias verb groups used in most previous studies (Dussias & Cramer Scaltz, 2008; Garnsey et al., 1997;

Wilson & Garnsey, 2009). This is because the statistical frequencies with which verbs occur in the DO or SC structure may show a large degree of variance, even for verbs within the same verb bias category. For example, the proportion of DO sentence completions reported for the verbs in the DO-bias category in Garnsey et al. (1997) range from 0.58 to 0.98. Therefore, using a split-group analysis and treating all verbs within the same verb category as homogeneous can lead to erroneous results and obscure differences that exist among verbs in the same category, as verb bias is in fact a continuous variable.

4. Results

Table 3 presents a summary of the written production data coded by type of sentence structure. The descriptive data is presented by verb bias category in order to provide a general picture of the difference in patterns for each group, but verb bias was treated as a continuous variable in the subsequent correlation analyses. The total number of sentences in which the verb was used with an intransitive structure (IT), preposition + NP object (P), and infinitival verb (INF) made up less than 2 percent of the entire data-set, and so these three structures were combined as the category *Other*.

Table 3. Number of Structures by Verb Type
(percentage of entire data in parentheses)

	DO-bias	EQ-bias	SC-bias	Total
DO (NP direct object)	155	91	48	294 (44.55%)
SC (SC without 'that')	17	48	67	132 (20%)
SC-that (SC with 'that')	28	57	79	164 (24.85%)
UNG (Ungrammatical)	12	23	24	59 (8.94%)
Other	8	2	2	12 (1.82%)

The summary of the written production data presented in Table 3 shows that DO, SC, and SC-*that* structures were most commonly used to complete the sentence. When SC-*that* and SC categories were combined, L2 learners produced approximately the same proportion of DO (44.55%) and SC structures (44.85%). However, the relative proportion of DO structures and SC structures used in the sentence completions varied by verb bias category. The percentage of DO structures accounted for 70.45% of the data for DO-bias verbs, 41.36% for EQ-bias verbs, and 21.82% for SC-bias verbs. The proportion of SC structures showed the reverse pattern, with SC structures (SC and SC-*that* combined) accounting for 20.45% of the sentence completions for DO bias verbs, 47.73% for EQ-bias verbs, and 66.37% for SC-bias verbs. Sentence structures other than the targeted DO and SC structure were relatively uncommon, composing only 1.82% of the data. 59 ungrammatical sentences were found in the data, with numerically more ungrammatical sentences found for EQ-bias and SC-bias verbs compared to DO-bias verbs.

Next, the results of the correlation analysis aimed to examine the use of verb bias and complementizer cues in the L2 written production data are presented in Table 4. As discussed previously, in order to eliminate potential issues stemming from treating verb bias as a categorical variable, the factor of verb bias was treated as a

continuous variable. Therefore, the factors in the correlation analysis were proportion of DO, SC-total, and SC-*that* structures obtained in the L2 data and strength of DO-bias, SC-bias, and *that*-preference reported in Garnsey et al. (1997). The factor of SC-total included the proportion of total SC structures (both with and without *that*) in the data to analyze whether the preference for a SC structure was positively correlated with the verb's strength of SC-bias. Occurrences of SC-*that* were included as a separate factor to examine its correlation with the strength of *that*-preference reported in Garnsey et al. (1997).

Table 4. Correlation Matrix for L2 Written Production Data

	1	2	3	4	5	6
1. DO (L2)	1					
2. SC-total (L2)	-.92***	1				
3. SC- <i>that</i> (L2)	-.86***	.91***	1			
4. DO-bias (L1)	.75***	-.70***	-.65***	1		
5. SC-bias (L1)	-.75***	.79***	.78***	-.75***	1	
6. <i>that</i> -preference (L1)	.61***	-.60***	-.56**	.66***	-.75***	1

**Correlation is significant at the .001 level

***Correlation is significant at the .0005 level

The proportion of sentences with DO structures for each verb in the L2 written production data showed a strong positive correlation with strength of DO bias ($r=.75$, $p<.0005$) and a strong negative correlation with the strength of SC bias ($r=-.75$, $p<.0005$). The proportion of sentence completions resulting in SC structures (with or without the complementizer) showed a similar pattern, with a significant positive correlation found with SC-bias strength ($r=.79$, $p<.0005$) and a significant negative correlation ($r=-.70$, $p<.0005$) with DO-bias strength.

The use of the complementizer *that* by the L2 learners showed discrepancies from

the native English speaker norming data in Garnsey et al. (1997). For native English speakers, a positive correlation was found between their use of the complementizer use and strength of DO-bias ($r=.66$, $p<.0005$) and a negative correlation was found between complementizer use and strength of SC-bias ($r=-.75$, $p<.0005$). In contrast, L2 learners showed the opposite pattern. The frequency of complementizer use in the L2 data was negatively correlated with DO-bias strength ($r=-.65$, $p<.0005$) and positively correlated with SC-bias strength ($r=.78$, $p<.0005$).

Next, the TOEIC scores for each participant were entered into a correlation analysis with the three factors from the L2 data (proportion of DO, SC-total, and SC-*that* structures). The factor of English proficiency did not show a significant correlation with any of the factors in the L2 production data (all $ps >.34$).

5. Discussion

This study investigated whether L2 learners' use of verb bias and complementizer cues in their written production of English sentences is similar to the optimal, efficient way in which native English speakers have been found to use these cues in previous studies. Results from both preliminary descriptive analyses and the correlation analyses showed that the L2 learners were sensitive to the probabilistic frequencies of the different structures a verb is used in and were capable of employing this information in their written production. The proportion of sentence completions with a DO structure showed a strong positive correlation with the verb's DO-bias strength and a strong negative correlation with the verb's SC-bias strength reported for native English speaker data (Garnsey et al., 1997). DO sentence completions increased in proportion to the strength of DO bias and decreased in

proportion to strength of SC-bias.

These results are consistent with previous studies that have shown that L2 learners are capable of using verbal cues in their processing of English sentences (Dussias & Cramer Scaltz, 2008; Lee et al., 2013; Qian et al., 2019; Şafak & Hopp, 2021). Furthermore, the L2 learners' use of verb bias information implied a sensitivity to differences in the degree of verb bias as a continuous variable, similar to native English speakers. These results underscore the importance of treating verb bias strength as a continuous variable instead of a categorical variable in the construction of experimental stimuli and analysis of the data.

In contrast to the similar patterns found between the L2 learners in the present study and native English speaker norming data in the use of verb bias information, results showed a divergent pattern in L2 learners' use of the complementizer *that* in sentences with a SC structure. Previous studies have reported that verb bias and complementizer cues show an interaction in L1 processing and production (Garnsey et al., 1997; Lee et al., 2013; Qian et al., 2019). Native English speakers prefer to omit the complementizer *that* when the sentential complement includes verbs with strong SC-bias, resulting in a significant interaction between the two cues. As the strength of SC-bias increases, the use of the complementizer *that* decreases proportionately. This interaction between verb bias and complementizer cues has been accounted for in terms of efficiency. Verbs which have a strong SC-bias are those which are used in SC structures much more frequently compared to their occurrence in DO constructions (Marcus, Santorini, & Marcinkiewicz, 1993; Macleod, Grishman & Meyers, 1997; Merlo, 1994; Lapata et al. 2001). Therefore, it would be redundant to use the complementizer, which is a clear cue that an embedded clause will follow. The upcoming SC structure can be easily predicted using these statistical frequencies provided by verb bias without the additional help of complementizer cues.

The results of the present study showed a highly significant positive correlation between the presence of the complementizer *that* and proportion of SC sentence completions and a highly significant negative correlation between complementizer use and proportion of DO completions. The tendency for increased use of the complementizer with verbs with strong SC-bias is the complete opposite of what was found in the native English speaker norming data, which showed a reliable negative correlation between the use of the complementizer and SC-bias strength.

These results imply that while L2 learners' sensitivity to verb bias cues is similar to that of native English speakers, the interaction between verb bias and complementizer is completely different. Whereas native English speakers prefer to omit the complementizer when it is redundant (for verbs with strong SC-bias), L2 learners show a stronger preference for the presence of the complementizer as the verb's SC-bias strength increases. The discrepancy in the use of verb bias and complementizer cues between L2 learners and native English speakers found in written production is consistent with results reported by previous studies for low-proficiency L2 learners (Lee et al., 2013; Qian et al., 2019).

The failure of L2 learners to use verb bias and complementizer cues to signal an upcoming SC in the optimal and efficient way that has been found for native English speakers cannot be due to their incomplete acquisition of verb bias. The gradual increase in DO or SC structures in proportion to the strength of the verb's DO or SC bias confirms that the L2 learners had indeed acquired verb bias and were using this information to decide on which sentence structure to use. A more likely explanation of this discrepancy is that the L2 learners were not sensitive to the redundancy of the complementizer in sentences with strong SC-bias verbs, and had not learned how to efficiently combine the two cues, which is similar to what has been suggested by Lee et al. (2013) and Qian et al. (2019). However, this explanation is not sufficient to

provide an explanation for why L2 learners preferred to use the complementizer more often for verbs with strong SC-bias.

If L2 learners had simply failed to learn how to use verb bias and complementizer cues to avoid redundancy in the most optimal, efficient way, the results should have shown a more random pattern of complementizer use, resulting in no significant correlations between complementizer use and DO/SC structures. However, significant correlations were found between complementizer use and both DO and SC structures in the L2 data, albeit in the opposite direction as the L1 norming data. These results suggest that the L2 learners did have a preference for complementizer use, which was to use the complementizer more for verbs with strong SC-bias and less for verbs with strong DO-bias.

A possible explanation for this seemingly counter-intuitive pattern of complementizer use by L2 learners compared to the more optimal, efficient interaction shown by native English speakers could be due to differences in the input that the two groups are exposed to. Exposure-based theories show that the statistical frequencies of different syntactic structures found in the linguistic input will significantly affect the processing and production of these structures by language users (Dussias & Sagarra, 2007; Frenck-Mestre & Pynte, 1997).

Child L1 English learners are mostly exposed to spoken language input containing the DO and SC structures during language acquisition. Afterwards, the probabilistic frequencies of the two structures are confirmed and strengthened through the written language input they encounter at school. For most L2 learners, the acquisition of English takes place primarily in the classroom, through formal instruction. Therefore, the input received is mostly the written input in textbooks. It is possible that compared to spoken input, written input includes a higher frequency of sentences in which the complementizer *that* precedes an embedded clause containing verbs with

strong SC-bias, such as *suggest*. This type of input may have reinforced the L2 learners' preference for the complementizer with strong SC-bias verbs. However, this is only a possible explanation of the results, and does not account for the negative correlation between the complementizer and DO-bias. Follow-up studies that further examine differences in the frequencies of sentence structures that native English speakers and L2 learners are exposed to are required to investigate this topic.

The present study did not find a reliable effect of proficiency on the use of verb bias and complementizer cues. A possible account for this lack of proficiency effects could be the L2 learners' high English proficiency. As production is generally viewed as a more difficult task for L2 learners compared to comprehension, it is unlikely that L2 learners with lower proficiency will use these cues in a way that resembles native English speakers. However, further studies are needed to shed more light on the effects of L2 proficiency on complementizer use in written production.

6. Conclusion

The present study examined the use of verb bias and complementizer cues by L2 learners in a written production task. The relative frequencies of DO and SC sentence structures used by the L1 Korean L2 English learners in this study were similar to the patterns found in previous L1 norming data, suggesting that the L2 learners were sensitive to graded differences in verb bias strength. However, L2 learners were not able to combine the two cues in the optimal, efficient way of native English speakers. For L2 learners, a counter-intuitive preference was found for the complementizer in sentences where it was not needed due to redundant cues from verb bias. The similarities and differences uncovered between L2 learners' and native

English speakers' use of multiple cues in English sentence production lead to concerns regarding the widespread use of L1 norming data in L2 experimental studies. The results of this study suggest that researchers conducting L2 studies should be cautious when using verbal information provided in native English speaker norming data to construct experimental material. The ideal alternative would be to conduct norming with L2 learners so as to provide a more accurate account of L2 learners' sensitivity to verb bias and complementizer use.

Notes

- 1) Participants rated their English proficiency from 1 to 5 (1='not proficient', 5='very proficient') for Reading, Writing, Speaking, and Listening.

Works Cited

- Brooks, Patricia, Michael Tomasello, Kelly Dodson, and Laurence Lewis. "Young Children's Overgeneralizations with Fixed Transitivity Verbs." *Child Development*, vol. 70, no. 6, 1999, pp. 1326-37.
- Chung, Taegoo. "Multiple Factors in the L2 Acquisition of English Unaccusative Verbs." *International Review of Applied Linguistics in Language Teaching*, vol. 52, no. 1, 2014, pp. 59-87.
- Dussias, Paola, and Tracy Cramer Scaltz. "Spanish-English L2 Speakers: Use of Subcategorization Bias Information in the Resolution of Temporary Ambiguity During Second Language Reading." *Acta Psychologica*, vol. 128, 2008, pp. 501-13.
- Dussias, Paola, and Nuria Sagarra. "The Effect of Exposure on Syntactic Parsing in Spanish-English Bilinguals." *Bilingualism: Language and Cognition*, vol. 10, no. 1, 2007, pp. 101-16.
- Frenck-Mestre, Cheryl, and Joel Pynte. "Syntactic Ambiguity Resolution While Reading in Second and Native Languages." *The Quarterly Journal of Experimental Psychology*, vol. 30, no. 1, 1997, pp. 119-48.
- Gahl, Susanne, Dan Jurafsky, and Douglas Roland. "Verb Subcategorization Frequencies: American English Corpus Data, Methodological Studies, and Cross-Corpus Comparisons." *Behavior Research Methods, Instruments, and Computers*, vol. 36, no. 3, 2004, pp. 432-43.
- Garnsey, Susan, Neal Pearlmutter, Elizabeth Myers, and Melanie Lotocky. "The Contributions of Verb Bias and Plausibility to the Comprehension of Temporarily Ambiguous Sentences." *Journal of Memory and Language*, vol. 37, 1997, pp. 58-93.

- Jiang, Nan. "Selective Integration of Second Language Knowledge in Second Language Learning." *Language Learning*, vol. 57, no. 1, 2007, pp. 1-33.
- Ju, Min Kyoung. "Overpassivization Errors by Second Language Learners." *Studies in Second Language Acquisition*, vol. 22, no. 1, 2000, pp. 85-111.
- Juffs, Alan. "Some Effects of First Language Argument Structure and Morphosyntax on Second Language Sentence Processing." *Second Language Research*, vol. 14, no. 4, 1998, pp. 406-24.
- Lapata, Maria, Frank Keller, and Sabine Schulte im Walde. "Verb Frame Frequency as a Predictor of Verb Bias." *Journal of Psycholinguistic Research*, vol. 30, 2001, pp. 419-35.
- Lee, Eun-kyung, Dora Hsin-yi Lu, and Susan Garnsey. "L1 Word Order and Sensitivity to Verb Bias in L2 Processing." *Bilingualism: Language and Cognition*, vol. 16, no. 4, 2013, pp. 761-75.
- Macleod, Catherine, Ralph Grishman, and Adam Meyers. "A Large Syntactic Dictionary for Natural Language Processing." *Computers and the Humanities* vol. 31, 1997, pp. 459-81.
- Marcus, Mitchell, Beatrice Santorini, and Mary Ann Marcinkiewicz. "Building a Large Annotated Corpus of English: The Penn Treebank." *Computational Linguistics*, vol. 19, 1993, pp. 313-30.
- Merlo, Paola. "A Corpus-based Analysis of Verb Continuation Frequencies for Syntactic Processing." *Journal of Psycholinguistic Research* 23 (1994): 435-447.
- Montrul, Silvina. "Transitivity Alternations in L2 Acquisition: Toward a Modular View of Transfer." *Studies in Second Language Acquisition*, vol. 22, no. 2, 2001, pp. 229-73.
- Novais-Santas, Susana, James Gee, Maliha Shah, Vanessa Troiani, Melissa Work, and

- Murray Grossman. "Resolving Sentence Ambiguity with Planning and Working Memory Resources: Evidence from fMRI." *Neuroimage*, vol. 37, no. 1, 2007, pp. 361-78.
- Oshita, Hiroyuki. "The Unaccusative Trap in Second Language Acquisition." *Studies in Second Language Acquisition*, vol. 23, no. 2, 2001, pp. 279-304.
- Osterhout, Lee, Phillip Holcomb, and David Swinney. "Brain Potentials Elicited by Garden-Path Sentences: Evidence of the Application of Verb Information During Parsing." *Journal of Experimental Psychology*, vol. 20, no. 4, 1994, pp. 786-803.
- Pickering, Martin, Matthew J. Traxler, and Matthew W. Crocker. "Ambiguity Resolution in Sentence Processing: Evidence Against Frequency-based Accounts." *Journal of Memory and Language*, vol. 43, 2000, pp. 447-75.
- Qian, Zhiying, Eun-kyung Lee, Dora Lu, and Susan Garnsey. "Native and Non-Native (L1-Mandarin) Speakers of English Differ in Online Use of Verb-based Cues About Sentence Structure." *Bilingualism: Language and Cognition*, vol. 22, no. 5, 2019, pp. 897-911.
- Şafak, Dugyu Fatma, and Holger Hopp. "Verb Bias and Semantic Persistence Effects in L2 Ambiguity Resolution." *Second Language Research*, 2021. <https://doi.org/10.1177/0267658321997904>
- Trueswell, John, Michael Tanenhaus, and Christopher Kello. "Verb-Specific Constraints in Lexical Preference from Garden-Paths." *Journal of Experimental Psychology: Learning, Memory, and Cognition*, vol. 19, no. 3, 1993, pp. 528-53.
- Wilson, Michael, and Susan Garnsey. "Making Simple Sentence Hard: Verb Bias Effects in Simple Direct Object Sentences." *Journal of Memory and Language*, vol. 60, 2009, pp. 368-92.

국문초록

제2 언어 학습자의 영어 글쓰기에 사용되는 동사 편향과
보문소에 관한 연구

김 지 현

단독 / 한국외국어대학교

본 논문은 제2 언어 학습자의 영어 글쓰기에 사용되는 동사 편향 정보와 보문소 *that*의 역할을 살펴본다. 영어를 제2 언어로 학습하는 한국어 화자를 대상으로 주어와 동사로 시작하는 문장을 완성하는 실험과제를 진행하였다. 실험에 사용된 30개의 영어 동사는 강한 ‘직접목적어 편향성’부터 강한 ‘보문절 편향성’까지 다양하게 포함되었다. 실험 결과, 영어 학습자들이 사용한 문장 구조와 각 문장에 사용된 동사 편향 정보 사이에 유의미한 상관관계가 발견되었으며, 직접목적어 편향성이 강할수록 직접목적어 구조를, 보문절 편향성이 강할수록 보문절 구조를 선택하여 문장을 완성하였다. 이 결과는 피험자인 제2 언어 학습자들이 영어 글쓰기를 할 때, 원어민 화자와 유사한 패턴으로 동사 편향 정보를 활용한다는 것을 보여준다. 그러나 동사 편향 정보와 보문소 *that*의 상호작용에 있어서는 기존의 원어민 데이터와는 다르게, 강한 보문절 편향의 동사일수록 보문소를 사용하고, 반대로 직접목적어 편향의 동사일수록 보문소를 생략하는 경향을 보였다. 이 논문은 실험 결과를 언어습득의 ‘노출기반이론’에 근거하여 제2 언어 학습자와 원어민 영어 화자의 차이점에 대하여 논의한다.

주제어: 동사 편향, 빈도 정보, 보문소, 예측 신호, 영어 글쓰기 과제

논문접수일: 2021.09.07

심사완료일: 2021.10.14

게재확정일: 2021.10.27

이름: 김지현

소속: 한국외국어대학교 영어통번역학부 부교수

주소: 경기도 용인시 처인구 모현읍 외대로 81

한국외국어대학교 영어통번역학부 (어문관 226호)

이메일: kimjhyon@hufs.ac.kr